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ABSTRACT

The inferential operations of mildly retarded students reading at the intermediate level were investigated using methods based on discourse comprehension theory. It was hypothesized that problems encountered in reading by these students were related to difficulties in generating logical inferences. Mildly retarded junior high school students and average third grade students of the same reading comprehension level read and recalled one descriptive expository and one narrative passage. On the expository passage, mildly retarded students generated the same quantity of inferences as average third grade students, but the inferences were of inferior quality. On the narrative passage the differences between the two groups were not significant. Differences in inferences generated by mildly retarded students may have been prompted by problems with schema mobilization, maintenance, and refinement in the context of dealing with descriptive expository text. (Author/MM)

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CENTER FOR THE STUDY OF READING

Technical Report No. 311

# INFERENTIAL READING ABILITIES OF MILDLY RETARDED AND AVERAGE STUDENTS

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Abstract

The inferential operations of mildly retarded students reading at the intermediate level were investigated using methods based on discourse comprehension theory. It was hypothesized that problems encountered in reading by these students are related to difficulties in generating logical inferences. Junior high, mildly retarded students and third grade, average students of the same reading comprehension level read and recalled a descriptive expository and a narrative passage. On the expository passage mildly retarded students generated the same quantity of inferences as average students but the inferences were qualitatively inferior. On the narrative passage the differences between the two groups were not significant. These findings were discussed in relation to the cognitive functioning of mildly retarded students.

# Inferential Reading Abilities of Mildly Retarded and Average Students

Mildly retarded students have difficulty learning to read beyond the third grade level and, for the most part, do not achieve in reading beyond the intermediate (third to fifth grade) level (Cegelka & Cegelka, 1970; Kirk, Kleibhan, & Lerner, 1978). Research has demonstrated that mildly retarded students read commensurate with their mental-age grade-expectancy at the primary reading level (Bennett, 1932; Blake, Aaron, & Westbrook, 1969). However, at the intermediate reading level, mildly retarded students achieve below their mental-age grade-expectancy and below the reading levels of nonretarded students of similar mental ages (Blake, et al., 1969; Bliesmer, 1954; Sheperd, 1967).

This difficulty in overall reading achievement at the intermediate level appears to be directly related to reading comprehension (Blake, et al., 1969; Bliesmer, 1954; Dunn, 1956; Shotick, 1960). Although these studies support the premise that mildly retarded students experience difficulty comprehending reading material when compared to nonretarded students, they tend to focus on arbitrarily defined skills which fail to capture the dynamic, connective nature of reading comprehension (Bos, 1979; Trabasso, 1980). In a recent study Luftig and Johnson (1982) utilized a recall procedure with connected discourse. The investigators found that retarded students recalled significantly fewer idea units than MA matched nonretarded students, although

both retarded and nonretarded groups had a sense of important and unimportant idea units. However, the inferential operations engaged in by the readers were not ascertained. In accordance with schema-theoretic views, inferences are not only important, they are a critical component of the reading comprehension process (Spiro, 1977).

The inferential abilities of mildly retarded students have been studied during simple problem solving and memory tasks. There is evidence to suggest that these students have difficulty applying strategies which require them to make logical inferences (Blackman, Whittemore, Zetlin, & McNamara, 1977; Brown & Campione, 1977; Byrnes & Spitz, 1977; Spitz & Borys, 1977).

Recently a technology, discourse analysis, has been developed which allows researchers to study a reader's comprehension of connected text and inferential operations using systematic, objective methods (Frederiksen, 1975, 1977; Kintsch & van Dijk, 1978; Meyer, 1975). Discourse comprehension theory, on which this technology is based, views reading comprehension as represented by the recall of the text, as the interaction between the reader's knowledge structure and the author's knowledge structure, as represented by the text itself. During comprehension and recall of written discourse, a reader interacts with the text in such a way that some information is recalled as it was explicitly represented in the text. On the other hand, some information is generated by the reader "to make sense" of the discourse. These inferences or inferred information are

crucial to the understanding of discourse. An example of a needed inference in the expository passage is present in the description of why beavers are not safe on land. The sentence reads, "If he (the beaver) lived on land, bears and mountain lions could catch him because he has short legs." To understand the connections between these statements the reader needs to add the implicit information that, "having short legs means the beaver cannot run fast." Other related inferences could also be generated by the reader based on the above text. For example, the statement that "Beavers do not live on land," is not explicitly stated, yet implied. Such inferences should be automatic for a mature reader, given the reader has the necessary background knowledge. This is not necessarily the case with readers experiencing difficulty in reading comprehension.

Using this concept of comprehension, models for representing the knowledge structure of the author and the reader have been developed, and systematic methods for comparing the reader's knowledge structure to the author's knowledge structure have resulted (Frederiksen, 1975; Kintsch, 1974; Mandler & Johnson, 1977; Meyer, 1975). These methods measure not only the amount of explicit information recalled by the reader, but they also measure the amount and type of "inferred" information generated. (It should be noted that the use of the lable "inferred" is quite arbitrary, for indeed inference is as essential to recalling explicit text-based information as it is to generating likely-to-

be inferred or new information.) The application of these methods has provided researchers with information concerning how readers comprehend discourse and, more specifically, how inferential operations function in the comprehension process (Tierney & Mosenthal, 1980).

The present study was designed to investigate the inferential operations of mildly retarded students during the recall of connected discourse. This study compared the quality and quantity of inferences generated by mildly retarded and nonretarded students reading at the intermediate level. Specifically, the following research questions were addressed:

(a) Do mildly retarded students generate fewer inferences than nonretarded students?

(b) Do mildly retarded students generate qualitatively different inferences when compared to nonretarded students?

(c) When directly probed using inference questions, do mildly retarded students generate fewer inferences?

## Method

This study compared 16 junior high level mildly retarded students and 16 average third grade students of the same reading comprehension level using a two-group, independent sample design.

### Subjects

The 16 mildly retarded students were identified as educable mentally retarded, were receiving special education services in a junior high, had chronological ages ranging from 12-7 to 14-9,

and had IQ's ranging from 52 to 71 as measured on individually administered intelligence tests. The 16 average students were enrolled in regular third grade classrooms, were not receiving special education or remedial reading services, had chronological ages ranging from 8-0 to 9-4, and had intellectual ability in the average range as judged by teachers. There were no significant differences between the two groups on reading comprehension level as measured by the Stanford Achievement Test, Primary Level II, Reading Comprehension ($t$ = .126, $df$ 1/30) (Madden, Gardner, Rudman, Karlsen, & Merwin, 1972), on recognition of the words in the passages ($t$ = .638, $df$ 1/30) and on background knowledge for the content of the expository passage ($t$ = .770, $df$ 1/30). Each of the three measures was administered to all subjects within a one-month time range.

Materials

Two passages were adapted from third grade reading materials. One passage was a 254-word descriptive expository passage on the topic of beavers. The narrative passage was a 228-word story about a girl who saves her father during a car accident. For each passage, inference questions were written on the propositions and logical relations left implicit in the passage, 12 for the expository passage and 11 for the narrative passage.

A practice passage was used to familiarize the subjects with the procedure and to acclimate them to being tape recorded. This

passage was a 90-word exposition on how to make donuts. An unrelated task (visual closure activity) was interspersed between the reading and recalling of each passage to serve as a control for surface structure memory (Kintsch, 1974).

Procedure

The reading session was conducted in a quiet room by the first investigator with each student being tested individually. The entire session was tape recorded (Sony Cassette Recorder, Model #TC-55) and later transcribed. The subject was told about the reading session using a standard set of instructions. First, the subject was given the practice passage to become familiar with the procedure. The subject read the practice passage silently, worked on the unrelated task for three minutes, orally recalled the passage, and orally answered the inference questions.

The same procedure was used for the expository passage and then the narrative passage. The expository passage always preceded the narrative passage because there is evidence to suggest that students at this reading level take the expository content and put it into a narrative structure when a narrative passage precedes an expository passage (Tierney, Bridge, & Cera, 1978-79). Standard instructions and prompts were used throughout the session. Up to five encouragements were used during the recall of the passages and ambiguous answers to the inference questions were queried.

Analyzing and Scoring the Recall

Each student's recall was analyzed and scored using an adaptation of Frederiksen's (1975, 1977, 1979) system of discourse analysis including the classification of inferences. In addition, a procedure for qualitatively categorizing each inference was utilized (Bos, 1979).

Analyzing the passages. Each passage was analyzed to obtain the passage message base. Each passage was divided into major propositions or ideas. Each proposition was analyzed using intrapropositional analysis based on case or semantic grammar (Fillmore, 1968; Frederiksen, 1977). The relationships between the propositions, i.e., the logical relations, were analyzed using interpropositional analysis. Examples of logical relations are conjunctive relations (and), temporal relations (then, next, first), conditional relations (if . . . then), causal relations (because, so, therefore), and contrastive relations (but). The statement, "If he (the beaver) lived on land, bears and mountain lions could catch him because he has short legs," is analyzed in Figure 1. As can be seen in Figure 1, this sentence contains three propositions or idea units, numbers 9.0, 10.0, and 12.0. There are also two logical relations which represent the connections among the three propositions. Number 11.0 demonstrates the conditional relationship between the beaver living on land (9.0) and bears and mountain lions catching him (10.0). Number 13.0 shows that the beaver having short legs would cause (causal relationship) him to be caught by bears and

mountain lions if the beaver lived on land. The passage message base for the descriptive expository passage had 43 propositions and 10 logical relations, while the narrative passage had 53 propositions and 11 logical relations.

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Insert Figure 1 about here.

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Analyzing the recall. Each subject's recall of each passage was analyzed to obtain the recall message base. The same procedure as for analyzing the passage was utilized to analyze each recall.

Scoring the recall. Each recall was scored by comparing the student's recall message base to the passage message base. First, each item (proposition and logical relation) was classified as explicit or inferred. An item was marked as explicit if it was represented in the passage. An item was marked as inferred or implicit if it was novel or not represented in the passage.

Second, each inferred item was classified according to the operation used in generating the inference and the type of inference using an adaptation of Frederiksen's taxonomy of inferences (Frederiksen, 1977). The two operations were proposition generation and logical relation. A proposition generation is when a new idea or proposition is generated by the reader. A logical relation inference is when a logical relation between explicit or inferred propositions is generated.

Third, each inferred item was categorized according to the quality of the inference (Bos, 1979). Drum (1978) and Tierney and Spiro (1979) have discussed the importance of studying the quality of inferences made by readers. Drum developed a categorization system which focused on the relatedness of the inference to the text as well as the correctness of the inference. The classification used in this study focused on the logical thinking employed in making the inference (plausibility) rather than on the correctness. This change in focus allowed the investigators to more clearly pinpoint the inferential abilities of the subjects as well as to obtain adequate interscore reliability. The three major categories of quality were: (a) plausible - represents logical thinking given the content of the passage, (b) implausible - represents an illogical thought given the content of the passage, and (c) irrelevant - represents information not related to the content of the passage.

For each passage, the number of inferred propositions and inferred logical relations were combined to give an inferred information score. The explicit propositions and explicit logical relations were combined for the explicit information score.

Scoring the Inference Assessment

For each passage, the subject's response to each inference question was scored as acceptable (2 points), partially acceptable (1 point), or unacceptable (0 points). Examples of

each type of response are given for the inference question, "Why could bears and mountain lions catch a beaver if he lived on land?" An acceptable response (2 points) would be, "Because beavers can't run as fast as bears and lions." This statement demonstrates the contrastive relationship between the beaver and the bear and mountain lion. A partially acceptable response (1 point) would be "Lions are fast." Although the inference is accurate, it does not address the relationship of the beaver to the lion. An unacceptable response would be "Because beavers are too fast." This statement is contradictory to the information given in the passage. The student's scores on the inference questions for each passage were tallied, and a total inference score obtained. For the expository passage 24 points were possible, and for the narrative passage 22 points were possible.

Reliability

To establish whether the use of the discourse analysis including the classification of inferences using both the Frederiksen (1977) and Bos (1979) system provided a reliable method of scoring the recalls, 25 percent of the recalls were randomly selected and scored by a second person trained in discourse analysis. Interscorer reliability was .90 for the expository passage and .88 for the narrative passage. Each inference assessment was also scored by an independent rater. Interscorer reliability was .94.

## Results

### Quantity of Inferences Generated During Recall

The scored recalls for each passage were analyzed separately to determine quantitative differences between the mildly retarded and average students. The two factor (group by type of information) mixed analyses of variance revealed no significant differences between the mildly retarded and average students on total inferred information generated for either passage (expository passage $F$ = .78, 1/30, $df$ = .61; narrative passage $F$ = .003, 1/30 $df$, $p$ = .95). This finding indicates that mildly retarded students do not generate fewer inferences than average students during recall.

### Quality of Inferences Generated During Recall

To determine qualitative differences, separate analyses of variance were computed for the plausible information, the implausible information, and the irrelevant information for each passage.

Expository passage. The results for the expository passage are presented in Table 1. The results indicate that the mildly retarded students generated significantly less plausible information than average students with 46 percent of the inferred information generated by mildly retarded students being plausible while 78 percent of the inferred information generated by average students was plausible. In addition, there was a near significant effect for implausible information ($p$ = .06) with approximately one-quarter of the inferred information generated

by mildly retarded students being implausible while only 5 percent of the information generated by the average students was implausible. There was no difference between the mildly retarded and average groups for the amount of irrelevant information generated with 29 percent and 18 percent being generated respectively. The irrelevant information generated by both groups was relatively high. Irrelevant information was defined as information not related to the content of the passage message base. A perusal of the irrelevant information showed that the majority of the irrelevant inferences generated by both groups focused on the topic of beavers but was not related to the content of the passage. An example would be a student reporting on what beavers eat. This information was not in the content of the passage but was on the same topic.

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Insert Table 1 about here.

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Tests of simple main effects for the plausible and implausible information were computed to determine how the two groups compared on each type of information, propositions and logical relations (Kirk, 1968). Mildly retarded students generated significantly fewer plausible propositions ($F = 4.31$, 1/30 df, $p < .05$) and significantly more implausible propositions ($F = 6.06$, 1/30 df, $p < .01$) than average students. For inferred logical relations mildly retarded students generated

significantly fewer plausible logical relations ($F = 3.99$, 1/30 df, $p < .05$) than average students, but the difference between the two groups for implausible logical relations was not significant ($F = 1.05$).

Narrative passage. The results of the narrative passage are presented in Table 2. The analyses for the narrative passage showed no significant main effects for qualitative measures. Implausible inferred information, however, did approach significance ($p = .07$). It should also be noted that virtually no irrelevant information was generated by either group which is in contrast to the results on the expository passage.

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Insert Table 2 about here.

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Inferences Generated During Direct Probing

The inference assessments were analyzed to determine the quantity of targeted inferences generated during direct probing. The two passages were analyzed using t-tests of significance. The results correspond to the findings concerning qualitative differences. For the expository passage the mildly retarded students scored significantly lower than the average students ($t = 3.37$, 1/30 df, $p < .01$). However, for the narrative passage a significant difference was not obtained ($t = 1.31$, 1/30) although the mildly retarded students did score lower ($x = 13.5$) than average students ($x = 15.1$).

## Discussion

The overall findings indicate that inferences generated by mildly retarded students are quantitatively equal to inferences generated by average students of the same reading comprehension level. There are, however, qualitative differences between the two groups for the inferences generated on the expository material. On the expository passage mildly retarded students generated fewer plausible inferences and more implausible inferences than average students. These findings were less pronounced on the narrative material, and differences between the two groups did not reach significant levels although the trend in the same direction was present. The results of both the expository and narrative inference assessments were consistent with the results from the recalls. On the expository passage the mildly retarded students scored significantly lower than average students; on the narrative passage no difference was found.

Based on previous research with problem solving and memory tasks, it was hypothesized that mildly retarded students would generate fewer inferences than average students. The findings, however, indicate that mildly retarded students generate approximately the same number of inferences as average students when reading and recalling text. This would lend support to the notion that mildly retarded students are engaging in the cognitive processes necessary for generating inferences.

The qualitative differences between the two groups on the descriptive expository passage indicate that mildly retarded

students appear less able than average students to generate inferences that represent logical thinking for expository material. There are several explanations for this difference.

First, mildly retarded students may bring more irrelevant knowledge to the reading task. This conclusion, however, is questionable because both groups appeared to be equally adept at bringing relevant knowledge to the reading task. This was demonstrated by the lack of differences between the two groups on the irrelevant inferences generated.

A second explanation may be that the generation of less plausible and more implausible information by the mildly retarded students on the expository passage may be more related to the nature of their recalls. A comparison of the two groups on the quantity of explicit information recalled on the expository passage showed that the mildly retarded students did, in fact, recall significantly less explicit information ($F$ = 11.35, 1/30 $df$, $p$ = .002). The mildly retarded students may have been generating plausible inferences given the information they recalled from the passage, although these inferences were implausible given the passage content. An informal analysis was used to determine if the inferred information was plausible given the explicit information the students recalled rather than given the content of the passage. The results for the expository passage showed that most of the propositions and logical relations originally judged as implausible were again judged as

implausible when given only the explicit information that the mildly retarded student recalled. Therefore, this explanation does not seem justified.

A third explanation is that mildly retarded students have less background knowledge than average students. The background knowledge assessment was used to indicate a student's schema for the content of the expository passage. There was no difference between the two groups ($t$ = .77) which indicates that both groups had similar background knowledge or schema for "beavers" (the topics of the expository passage). No assessment, however, was given to determine the student's schema for descriptive expository material. Therefore, it may be that mildly retarded students are less adept at dealing with descriptive expository material than the average students, and the qualitative differences between the two groups are due in part to differences in assessing, mobilizing, maintaining and refining schema. Collins, Brown, and Larkin (1977) aptly describe this process:

> "The initial model is a partial model, constructed from schemas triggered by the beginning elements of the text. The models are progressively refined by trying to fill in unspecified slots in each model as it is constructed . . . and the search for relevant information is constrained more and more." (pp. 4-5)

It is interesting to note that qualitative differences between the two groups were not significant for the narrative passage. This may suggest that mildly retarded students are more adept and

more similar to average students at dealing with narratives--that is, mildly retarded students have less difficulty developing a plausible "model" for the narrative text.

In summary, based on the qualitative difference evidenced on the expository text, it can be concluded that the differences in inferences generated by mildly retarded students appear to be due to problems associated with schema mobilization, maintenance, and refinement in the context of dealing with descriptive expository text. While the viability of a qualitative assessment of inferential behavior is difficult to operationalize, the present study suggests a number of directions for research involving mildly retarded students. In particular, the present research has alluded to a schema-related explanation which may be associated with the differences between mildly retarded and average students. Further research which focuses on the inferential operations of mildly retarded students when reading, will require an examination of both background knowledge for content as well as text structure. Upon further clarification of the discourse processing operations of mildly retarded students, the training aspect of inferential operations can be addressed.

## References

Bennett, A. (1932). A comparative study of subnormal children in the elementary grades. New York: Teachers College, Columbia University, Bureau of Publications.

Blackman, L., Whittemore, C., Zetlin, A., & McNamara, B. (1977). Use of constraint-seeking questions by retarded and nonretarded individuals. American Journal of Mental Deficiency, 82, 19-25.

Blake, K., Aaron, I., & Westbrook, H. (1969). Learning of basal reading skills by mentally handicapped and non-mentally handicapped children. Journal of Research and Development in Education, 2, 1-138.

Bliesmer, E. (1954). Reading abilities of bright and dull children of comparable mental ages. Journal of Educational Psychology, 45, 321-331.

Bos, C. (1979). Inferential operations in the reading comprehension of educable mentally retarded and average students. Unpublished doctoral dissertation. Tucson: University of Arizona.

Brown, A., & Campione, J. (1977). Training strategic study time apportionment in educable retarded children. Intelligence, 48, 1-8.

Byrnes, M., & Spitz, H. (1977). Performance of retarded adolescents and nonretarded children on the tower of Hanoi problem. American Journal of Mental Deficiency, 81, 561-569.

Cegelka, P., & Cegelka, W. (1970). A review of research: Reading and the educable mentally handicapped. Exceptional Children, 37, 187-200.

Collins, A., Brown, J., & Larkin, K. (1977). Inference in text understanding (Tech. Rep. No. 40). Urbana: University of Illinois, Center for the Study of Reading, December. (ERIC Document Reproduction Service No. ED 150 547)

Drum, P. (1978). Prose recall responses and categories for scoring. In P. Pearson & J. Hansen (Eds.), Reading: Disciplined inquiry in process and practice. Clemson, SC: National Reading Conference, Inc.

Dunn, L. (1956). A comparison of the reading processes of mentally retarded and normal boys of the same mental age. Studies of reading and arithmetic in mentally retarded boys. Lafayette, IN: Society for Research in Child Development, Inc.

Filmore, C. (1968). The case for case. In E. Bach & R. Harmes (Eds.), Universals in linguistic theory. New York: Holt, Rinehart & Winston.

Frederiksen, C. (1975). Representing logical and semantic structure of knowledge acquired from discourse. Cognitive Psychology, 7, 371-458.

Frederiksen, C. (1977). Inference and the structure of children's discourse. Paper presented at the Society for Research in Child Development, New Orleans.

Frederiksen, C. (1979). Discourse comprehension and early reading. In L. Resnick & P. Weaver (Eds.), Theory and practice of early reading, Vol. 1. Hillsdale, NJ: Erlbaum.

Kintsch, W. (1974). The representation of meaning in memory. Hillsdale, NJ: Erlbaum.

Kintsch, W., & van Dijk, T. (1978). Toward a model of text comprehension and production. Psychological Review, 85, 363-394.

Kirk, R. (1968). Experimental design: Procedures for the behavioral sciences. Belmont, CA: Wadsworth Publishing Co., Inc.

Kirk, S., Kliebhan, J., & Lerner, J. (1978). Teaching reading to slow and disabled learners. Boston: Houghton Mifflin Co.

Luftig, R., & Johnson, R. (1982). Identification and recall of structurally important units in prose by mentally retarded learners. American Journal of Mental Deficiency, 86, 495-502.

Madden, R., Gardner, E., Rudman, H., Karlsen, B., & Merwin, J. (1972). Stanford achievement test, Primary level II (NCS Edition). New York: Harcourt Brace Jovanovich, Inc.

Mandler, J., & Johnson, N. (1977). Remembrance of things parsed: Story structure and recall. Cognitive Psychology, 9, 111-151.

Meyer, B. (1975). The organization of prose and its effect on recall. Amsterdam: North Holland Publishing Co.

Sheperd, G. (1967). Selected factors in the reading ability of educable mentally retarded boys. American Journal of Mental Deficiency, 71, 563-570.

Shotick, A. (1960). A comparative investigation of the performance of mentally retarded and intellectually normal boys on selected reading comprehension and performance tasks. Unpublished doctoral dissertation. Syracuse, NY: Syracuse University.

Spiro, R. (1977). Remembering information from text: The "state of schema" approach. In R. Anderson, R. Spiro, & W. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, NJ: Erlbaum.

Spitz, H., & Borys, S. (1977). Performance of retarded adolescents and nonretarded children on one- and two-bit logical problems. Journal of Experimental Child Psychology, 23, 415-429.

Tierney, R., Bridge, C., & Cera, M. (1978-79). The discourse processing operations of children. Reading Research Quarterly, 14, 539-573.

Tierney, R., & Mosenthal, J. (1980). Discourse comprehension and production: Analyzing text structure and cohesion (Tech. Rep. No. 152). Urbana: University of Illinois, Center for the Study of Reading, January. (ERIC Document Reproduction Service No. ED 179 945)

Tierney, R., & Spiro, R. (1979). Some basic notions about reading comprehension: Implications for teachers. In J. Harste & R. Carey (Eds.), New perspectives in comprehension. Bloomington, IN: Indiana University Monographics on Language and Thinking.

Trabasso, T. (1980). On making of inferences during reading and their assessment (Tech. Rep. No. 157). Urbana: University of Illinois, Center for the Study of Reading, January. (ERIC Document Reproduction Service No. ED 181 429)

Table 1

Summary of the Qualitative Differences Between Mildly Retarded and Nonretarded Students on the Expository Passage

| Quality of Inferred Information | EMR (n=16) Mean | SD | % | Average (n=16) Mean | SD | % | F-test (df=1/30) | p |
|---|---|---|---|---|---|---|---|---|
| Plausible | 2.750 | 3.36 | 46 | 6.063 | 4.34 | 78 | 5.83 | .02 |
| Implausible | 1.438 | 2.07 | 24 | .375 | .72 | 5 | 3.78 | .06 |
| Irrelevant | 1.750 | 3.86 | 29 | 1.375 | 2.92 | 18 | .10 | .76 |

Table 2

Summary of the Qualitative Differences Between Mildly Retarded and Nonretarded Students on the Narrative Passage

| Type of Inferred Information | EMR (n=16) Mean | SD | % | Average (n=16) Mean | SD | % | F-test (df=1/30) | p |
|---|---|---|---|---|---|---|---|---|
| Plausible | 7.875 | 4.62 | 66 | 10.500 | 4.94 | 88 | 2.41 | .13 |
| Implausible | 3.938 | 4.49 | 33 | 1.438 | 3.01 | 12 | 3.41 | .07 |
| Irrelevant | .125 | .34 | 1 | .000 | .00 | 0 | 2.14 | .15 |

Figure Caption

Figure 1. Sample of Discourse Analysis (Discourse analysis system adapted from Frederiksen (1975))

If he lived on land,

9.0 (beaver) PAT@TEN(PAST)→ (live) LOC→ (land, on)

bears and mountain lions could catch him

10.0 (bears) AGT@TEN(PAST)@QUAL(CAN)→ (catch) OBJ→ (beaver)

(lions) CAT ATT→ (mountain)

11.0 (9.0) COND(if)→ (10.0)

because he has short legs.

12.0 (beaver) HASP→ (legs) EXT ATT→ (short)

13.0 (12.0) CAU (because)→ (11.0)